

REMARKS

Entry of the foregoing, re-examination and reconsideration of the subject matter identified in caption, as amended, pursuant to and consistent with 37 C.F.R. § 1.111, and in light of the remarks which follow, are respectfully requested.

In the Amendment, claim 1 has been amended to further improve its form and/or clarity. The amendments are supported by the specification, for example, paragraphs [0021], [0022], [0050] and [0056].

No new matter has been added. Upon entry of the Amendment, claims 1-10 will be all the claims pending in the application.

I. Drawings

Applicants note that the Office Action is silent regarding the drawings (2 sheets) filed June 22, 2006. The Examiner is respectfully requested to acknowledge acceptance of the drawings in the next PTO communication.

II. Response to Rejection under 35 U.S.C. § 112, Second Paragraph

Claims 1-10 were rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. Applicants respectfully submit that the claims as amended are not indefinite for at least the following reasons.

In the Amendment, claim 1 has been amended to further recite that the thin tube comprises one of the tubular body (a) and the tubular body (b), and that the thick tube comprises the other of the tubular body (a) and the tubular body (b). Further, claim 1 has been amended to replace "the connected part" with --an interposed part of absorbent--. Claims 2-10 depend from claim 1. Accordingly, the Examiner is respectfully requested to reconsider and withdraw the § 112 rejection.

III. Response to Rejections under 35 U.S.C. § 103(a)

a. Claims 1 and 3-10 were rejected under 35 U.S.C. § 103(a) as allegedly being obvious over U.S. Patent Application Publication No. 2002/0100540 ("Savitski") in view of U.S. Patent Application Publication No. 2002/0179233 ("Ruotsalainen") and U.S. Patent No. 5,260,394 ("Tazaki").

b. Claim 2 was rejected under 35 U.S.C. §103(a) as allegedly being obvious over Savitski, Ruotsalainen, Tazaki and further in view of U.S. Patent No. 5,356,709 ("Woo").

Applicants respectfully traverse the rejections for the following reasons.

Independent claim 1 recites a method for the production of a tubular article resulting from joining by insertion a tubular body (a) possessed of a layer comprised of a thermoplastic resin composition (A) containing a styrene type elastomer and a polyolefin type resin and a tubular body (b) comprised of a thermoplastic resin composition (B) containing a polyolefin, comprising: (i) a step of interposing an absorbent having an absorption wavelength of 700 - 2,500 nm on the tubular body (a) and/or the tubular body (b) to form an interposed part of absorbent, (ii) a step of connecting by mutual insertion the tubular body (a) and the tubular body (b), and (iii) a step of causing the interposed part of absorbent to adhere by irradiation with a laser beam, thereby forming the tubular article having a thin tube and a thick tube, wherein the thin tube comprises one of the tubular body (a) and the tubular body (b), and the thick tube comprises the other of the tubular body (a) and the tubular body (b), wherein prior to the mutual insertion, a ratio of an outside diameter of the thin tube and an inside diameter of the thick tube (outside diameter of thin tube/inside diameter of thick tube = X) in the range of $1 < X < 1.25$, and wherein the storage elastic modulus of the tubular body (a) is in the range of $1.0 \times 10^7 - 6.7 \times 10^8$ Pa, the storage elastic modulus of the tubular body (b) is in the range of $2 \times 10^7 - 9 \times 10^8$ Pa, and the storage elastic modulus of the tubular body (b) is higher than that of the tubular body (a).

As described in paragraphs [0009] to [0011] of the present specification, adhering tubular bodies comprised of a resin containing a polyolefin has various technical problems, e.g., difficulties in achieving good adhesion to other resins while maintaining high airtightness and transparency.

On the contrary, in the presently claimed invention, when a tubular article is made by connection of a tubular body (a) comprised of a thermoplastic resin composition containing a styrene type elastomer and a polyolefin type resin and a tubular body (b) comprised of a polyolefin type resin, the two tubular bodies can be welded with maintaining their transparency, thereby enabling production of a tubular article excelling in adhesive strength. Further, by adjusting the diameters of the insertion parts of the specific tubular bodies (a) and (b) within the specified range (X), it is possible to produce excellent adhesive force and attain tight connection of the surfaces of adhesion without requiring a pressing step. Moreover, by using the tubular bodies (a) and (b) having the specified storage elastic modulus, it is possible to improve the mold releasing property thereof, to lower the haze value and thus improve the visibility. Still further, by using the tubular body (b) having the specified storage elastic modulus higher than that of the tubular body (a), it is possible to achieve excellent inserting property of the tubes during the course of assemblage and low material costs. Furthermore, by applying an absorbent to the tubular body (a) and/or (b) prior to insertion, the absorbent is present in the connected parts, thereby avoiding difficulty in attaining the presence of the absorbent after the connection of the tubular bodies (a) and (b). See paragraphs [0014] - [0018], [0021], [0045] and [0055] of the present specification.

Applicants wish point out that the tubular body (a) recited in claim 1 is comprised of a thermoplastic resin composition containing a styrene type elastomer and a polyolefin type resin. That is, the thermoplastic resin composition contains a mixture of a styrene type elastomer and a polyolefin type resin (see also Examples in the present specification).

Savitski discloses a method for production of lap and butt joints of two pipe ends through a radiation transmitting material coupling having an absorbing material (abstract). Savitski further describes that the transmitting material may include "organic and inorganic substances and polymers and plastics including both thermoset and thermoplastic materials ... acrylics, ultraviolet (UV) grade acrylics, polystyrenes (PS), polycarbonates (PC), methylmethacrylates, styrene-acrylonitriles, polyolefins, nylons, fluoropolymers such as polyvinylidene fluoride (PVDF), methylpentenes, epoxies, silicones, and urethanes" (paragraph [0059]). Savitski does not disclose or suggest a combined use of a styrene type elastomer and a polyolefin type resin as the transmitting material. In addition, the Examiner concedes that Savitski does not disclose any relationship of the diameters of the tubes (relevant to the X value recited in present claim 1).

The Office Action asserts that "it is inherent a tube made of polyolefin would have a storage elastic modulus in the ranges of 2×10^7 - 9×10^8 Pa because the material disclosed by Savitski is the same as the claimed material" (page 4, lines 9-11). Applicants respectfully disagree.

The term "polyolefin" is a generic term encompassing a group of polymeric materials, which may contain different types, arrangements and numbers of olefin monomeric units, and thus may have different molecular structures and properties. The Examiner has not pointed out any evidential support of record showing that the polyolefin described in Savitski necessarily have the recited storage elastic modulus of 2×10^7 - 9×10^8 Pa.

Ruotsalainen discloses a process for transmission laser welding of a first plastic part and a second plastic part which are connected by means of an interference fit connection (Abstract). Ruotsalainen further describes that "at the contact zone, pressure forces due to the interference fit exist, which cause an outer surface portion of the second plastic part and an inner surface portion of the first plastic part to be pressed against each other" (paragraph [0009]). This configuration can provide "an intimate contact between the two parts" and thus "avoid the

formation of voids" during the welding, thereby providing an airtight and water tight sealing after welding while not requiring clamping means (paragraphs [0009] and [0020]).

Applicants respectfully submit that there would have been no motivation to modify the configuration described in Savitski by providing interference fit as described in Ruotsalainen between one or two pipe pieces and the radiation transmitting material. Specifically, Savitski aims to provide both butt and lap joints between two pipe ends. In a butt joint configuration, the end of a first pipe piece is butted against the end of a second piece (paragraph [0028]). To facilitate the formation of the butt joint, pressure 60 is applied to the first piece 20 and/or the second piece to further improve the fusion of the molten material forming the butt joint bond between ends 14 and 24 (Figure 3 and paragraph [0068]).

It is believed that formation of interference fit as described in Ruotsalainen between one or both pipe parts and the radiation transmitting material in the configuration of Savitski would not provide the desired pressure between the two pieces for butt joint formation. Moreover, such interference fit would likely make application of pressure against one or two pipe ends difficult, thereby resulting in weak butt joints. Therefore, one of ordinary skill in the art would have had insufficient motivation to modify Savitski by providing interference fit between one or both pipe parts and the radiation transmitting material.

Moreover, Savitski describes that the pipes are typically clamped in place to provided lateral pressure to urge ends 14 and 24 toward each other (paragraph [0070]). That is, clamping is provided not only to hold the pipes in place for welding, but also to provide forces to bring the two pipe ends sufficiently close together to facilitate the formation of butt joints. Thus, Savitski teaches away from not clamping the pipes.

Tazaki discloses a styrene copolymer formed from a styrene and an olefin (Abstract). That is, the polymer described in Tazaki is a styrene-olefin copolymer. On the contrary, as noted above, the thermoplastic resin composition recited in present claim 1 contains a mixture of

a styrene type elastomer and a polyolefin type resin, which is different from the styrene-olefin copolymer described in Tazaki. Further, Tazaki does not rectify the deficiencies of Savitski and Ruotsalainen.

Woo is relied upon merely as disclosing a multiple-layered material for making medical grade tubes, and thus does not rectify the deficiencies of Savitski, Ruotsalainen and Tazaki.

Therefore, even if Savitski, Ruotsalainen, Tazaki and Woo are combined, the combination still would not result in the subject matter recited in present claim 1, particularly, the thermoplastic resin composition for the tubular body (a), the X value, and the storage elastic modulus of the tubular bodies (a) and (b) and relationship thereof. Moreover, none of the cited references disclose or suggest the above-mentioned superior results obtainable in the presently claimed invention.

In view of the foregoing, Applicants respectfully submit that claim 1 is not obvious over Savitski in view of Ruotsalainen and Tazaki, and further in view of Woo, and thus the rejections should be withdrawn. Additionally, claims 2-10 depend from claim 1, directly or indirectly, and thus are patentable over the cited references at least by virtue of their dependency.

IV. Conclusion


From the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order and such action is earnestly solicited. If there are any questions concerning this paper or the application in general, the Examiner is invited to telephone the undersigned at (202) 452-7932 at his earliest convenience.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: DRAFT

By:



Fang Liu, Ph.D.
Registration No. 51283